DEVELOPMENT OF AN AEROSOL OPACITY RETRIEVAL ALGORITHM FOR USE WITH MULTI-ANGLE LAND SURFACE IMAGES

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The. Multi-angle Imaging SpectroRadiometer (MISR) is scheduled for launch on the AM-1 platform of the Earth Observing System (EOS) in 1998, The instrument consists of nine pushbroom cameras that image the Earth in the nadir direction and at view angles of 26.1°,45.6°,60.0°, and 70.5° forward and aftward of nadir. Each camera acquires data in four spectral bands (443, 555,670, and 865 nm) over a 360-km swath width with sample spacing, selectable in flight, of 275 m, 550 m, or 1,1 km. Present plans are to acquire imagery in the 670 nm band at all nine angles at 275 m. At this sample spacing, scattering within the atmosphere causes a spatial "blurring" of the radiation field which is diffusely transmitted from the surface to space. Consequently, over land surfaces with heterogeneous reflectance, most of the spatial power is in the directly transmitted field, and high-pass spatial filtering of the data will remove both the horizontally homogeneous atmospheric path radiance (light which is reflected by the atmosphere without reaching the surface) as well as the slowly varying diffusely transmitted field owing to their make-up by zero or low spatial frequencies. The remaining signal in the filtered imagery is proportional to the atmospheric transmittance, which depends on the column aerosol opacit y and view angle in a predictable way. The principal challenge to using this signal to determine the opacity is the non-lambertian character of the surface reflectance. Simulated MISR data sets based on field measurements and surface bidirectional reflectance models arc being used to develop an approach for solving this problem. The approach relies upon using the imagery at the most oblique angles, where the atmospheric signal is accentuated. The usc of ASAS data as part of the algorithm development process will be discussed.

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